"A COMPARATIVE STUDY ON EFFECTIVENESS OF HIGH INTENSITY AND LOW INTENSITY INSPIRATORY MUSCLE TRAINING IN SEDENTARY LIFE STYLE PEOPLE"

Project

Submitted To

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In partial fulfillment for the degree of

MASTER OF PHYSIOTHERAPY

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CERTIFICATE

The work embodied in the thesis entitled "**A COMPARATIVE STUDY ON EFFECTIVENESS OF HIGH INTENSITY AND LOW INTENSITY INSPIRATORY MUSCLE TRAINING IN SEDENTARY LIFE STYLE PEOPLE"** Submitted to the Tamil Nadu Dr.MGR Medical University, Chennai in the partial fulfillment for the degree of Master of Physiotherapy, was carried out by candidate bearing register number of 271430161 at Cherraan's College of Physiotherapy, Coimbatore under my supervision. This is an original work done by her and has not been submitted in part or full for any other degree/diploma at this or any other university/ institute. The thesis is fit to be considered for evaluation for award of the degree of Master of Physiotherapy.

Signature of Guide

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Signature of Principal

Prof.E.Selva Rani MPT(Neuro).,

Date: ……

Date:……..

Internal Examiner

External Examiner

Project work evaluated on …….

DECLARATION

I hereby declare and present my project work entitled "**A COMPARATIVE STUDY ON EFFECTIVENESS OF HIGH INTENSITY AND LOW INTENSITY INSPIRATORY MUSCLE TRAINING IN SEDENTARY LIFE STYLE PEOPLE"**

The outcome of the original research work undertaken and carried out by me, under the guidance of Professor Mr.V. Karthik M.P.T., MBA., PGDF.,CMT.,MIAP, Cherraan's College of Physiotherapy, Coimbatore.

I also declare that the material of this project work has not formed in anyway the basis for the award of any other degree previously from the Tamil Nadu Dr. M.G.R Medical University, Chennai-32.

SIGNATURE OF SUPEVISOR SIGNATURE OF STUDENT

Date :

Place:

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ABSTRACT

OBJECTIVE: To systematically a comparative study on effectiveness of high intensity and low intensity inspiratory muscle training in sedentary life style people.

DESIGN: This study is a pre test and post test experimental design comparative in nature.

PARTICIPATION: Thirty subjects aged 35 to 50 years of sedentary life people with BMI 30 to 35 kgm^2 were selected. They were trained with high and low intensity of inspiratory muscle.

OUTCOME MEASURES: The outcome was measured using Chronic Respiratory Disease Questionnaire Self-Administered Standardized format and Modified Borg Scale.

RESULTS: Statistical analysis done by using paired‘t’ test and unpaired ‘t’ test showed that there was significant improvement in subjects who underwent the training with high and low intensity.

CONCLUSION: Hence, it is concluded that the sedentary life people who underwent high intensity inspiratory muscle training had a higher performance capacity when compared to the people who underwent low intensity inspiratory muscle training.

CHAPTER I
INTRODUCTION

Sedentary Lifestyle has reached epidemic proportions and increasing physical activity plays an important role in reducing risk factor of obesity. Cohort studies have demonstrated that increasing immobilized activity in associated with significantly increased risk of obesity.

Type of life style with no or irregular physical activity is commonly found in both the developed and developing world. Risk associated with sedentary lifestyle based on activities include sitting, reading, watching TV, playing video games and computer used for much of the day with little or non vigorous physical activity exercise un healthy diets and physical inactivity are major risk factors for overweight and obesity.

Obesity play a significant role in the pathogenesis of pulmonary disease through mechanism that may involve pro inflammatory mediators produced in adipose tissue that contributes to a low grade state of systemic inflammation. Inflammatory response in lungs have shown to influence the production of adipocytokines, leptin and adiponectin, cytokines, acute phase protein and other mediators produced by adipose tissue that may participate in immune response of the lung. increase adipose tissue mass influence susceptibility to pulmonary infection ,enhance pulmonary inflammation ,airway obstruction. Obsity influence pulmonary inflammation may facilitate the development of novel therapeutic intervention for the treatment of lung disease.

A chort study of Canada shows obese people with BMI 30 – 34.9 and class 2 or 3 BMI which 35 individual to have a respiratory hospitalization. The prevalence of obesity has Increase dramatically worldwide. In one survey of 3000 patients with obesity 30 BMI has 56 % were found to have breathlessness during normal physical activities and 42 % reporter breathlessness while doing household chores progression of obesity results in dyspnoea during activities of daily living with respiratory

expression and introduced health related quality of life. Optimizing function through a reduction in dyspnoea has been identified as a key goal for the management of obesity. It is notable that body exercise training does not improve respiration muscle strength or endurance.

Obesity and sedentary life style are escalating and global epidermis that warrant increased attention by physicians and other health care professionals. These intricately linked conditions are responsible for and Anomalous burden of chronic disease impaired physical function and quality of life at least 3 lakh premature deaths and at least 90 billion in indirect Healthcare cost annually in US alone.

Clinicians are on the front line of combal yet these conditions receive minimal attention during a typical office visit. clinicians often feel over whelmed by these challenges and point to an absence of clear guidelines and practice tools minimal training in behaviour modification Strategies and lack of time as reasons for failing to confront them. This report provides a call to action with step by step guidelines specifically directed at the pivotal role of physicians and other health care professionals in curbing these dangerous epidemics. To facillate more effective intervention related to obesity and in activity requires only a few minutes of clinicians time to implement would favorably impact public health.

Data were drawn from the DYNOPTA data set which was derived by harmonizing and pooling common measures from five longitudinal ageing studies. Mini to mental State examination was available were included. Data on education sex, BMI and sedentary lifestyle were collected and mortality data were obtained. Population level reduction in smoking, sedentary lifestyle and obesity increases longevity and number of years lived without cognitive impairments.

Regular exercise is important for the maintenance global health but many people do very little exercise. There are public health concern about activating the sedentary and form an epidemiological measurement perspective, there are advantages in assessing physical activities. Using pooled data from 17053 participated in Australian population surveys it was identified that 29.7% could be classified as sedentary in their recreational exercise habits.

Logistic regression analysis found the inactive to be more likely to be older, less well educated and low income. Women were more likely to report being physically unable to exercise. The greatest health benefit will result from the sedentary becoming more active and inexpensive and convenient activities such as walking needed to be emphasized.

Inspiratory Muscle Dysfunction contributes to the origin of dyspnoea in sedentary life style people (Rochester 1991), therefore addition of specific inspiratory muscle training to whole body exercise may yield further reductions in dyspnoea. In recent years, the concept of "health-related quality of life" has gained importance in the assessment of healthcare interventions. Health-related quality of life allows assessment of multiple domains in the experience of chronic illness.

Sedentary life style people health status measurements, such as the St. George Respiratory Questionnaire (SGRQ) and Chronic Respiratory Questionnaire (CRQ), provide complementary information to that obtained from spirometry. Although they have an established place in clinical trials, they have not been incorporated into routine clinical assessment.

It appears that specific loading of the inspiratory muscles with commercially available hand-held devices using training intensities of at least 30% of the previously determined maximum inspiratory pressure can improve inspiratory muscle strength and endurance thereby reducing dyspnoea (Lotters et al 2002). The present study reveals the effects of high and low intensity inspiratory muscle training on dyspnoea and quality of life in sedentary life style people.

1.1 NEED OF THE STUDY

Consequently, we have limited information on people under sedentary life style seen at the less disabling stages that account for much of the care provided by family physicians and general internists. We also know little about how these "real world" people are being recognized, how frequently inspiraotory muscle training is used, and the degree of lung function impairment in those diagnosed with BMI 30-35 kg/m^2. In addition, there is little published data about how muscle training for these people is adherent to management guidelines and whether or not they remain symptomatic despite therapy.

1.2. STATEMENT OF THE PROBLEM

"A Comparative study on effectiveness of high intensity and low intensity inspiratory muscle training in sedentary life style people".

1.3. OBJECTIVES

- To determine the effect of High intensity inspiratory muscle training on dyspnoea during daily activities and QOL.
- To determine the effect of Low intensity inspiratory muscle training on dyspnoea during daily activities and QOL.
- To find out the effective intensity of inspiratory muscle training in people under sedentary life.

1.4. HYPOTHESIS

Null Hypothesis

- There is no significant difference in high intensity inspiratory muscle training on dyspnoea and QOL in sedentary lifestyle peoples.
- There is no significant difference in low intensity inspiratory muscle training on dyspnoea and QOL in sedentary lifestyle peoples.
- There is no significant difference between high intensity and low intensity inspiratory muscle training on dyspnoea and QOL in sedentary lifestyle peoples.

Alternate Hypothesis

- There is significant difference in High intensity inspiratory muscle training on dyspnoea and QOL in people under sedentary life.
- There is significant difference in low intensity inspiratory muscle training on dyspnoea and QOL in sedentary lifestyle peoples.
- There is significant difference between high intensity and low intensity inspiratory muscle training on dyspnoea and QOL in sedentary lifestyle peoples.

1.5. OPERATIONAL DEFINITIONS

Sedentary life style

Sedentary life style is a type life style with no or irregular physical activity .It is commonly found in both the developed and developing world.

Self-Administered Version of the Chronic Respiratory Disease Questionnaire (CRQ-SAS):

One of the most widely used measures of health related quality of life in chronic respiratory disease is traditionally interviewer administred and includes an individualized dyspnoa domain.

The standardized dyspnoea domain includes 5 questions that evaluate 5 activities that produce respiratory difficulties in sedentary life style people.

1. Feeling emotions, such as anger or disgust.
2. Personal hygiene (bathing, showering, eating or dressing).
3. Walking.
4. Performing routine daily activities (housework, shopping, errands, grocery shopping).
5. Participating in social activities (meeting with family, friends, neighbors or groups).

Quality of life

The standard of health, comfort and happiness experienced by an individual or group. Quality of life is the general well being of individuals and societies, outlining negative and positive features of life. It observes life satisfaction including everything from physical health, family, education, employment, wealth, religious beliefs, finance and the environment.

BORG SCALE

The Borg Scale is a simple method of rating perceived exertion (RPE) and can be used by coaches to gauge and athletes level of intensity in training and competition.

Dyspnoea

Dyspnoea sometimes referred to as “shortness of breath” or “breathlessness” by the patient, is a common and significant symptom of patients with chronic obstructive pulmonary disease.

High Intensity

High intensity exercise is defined as exercise at ≥ 60-90% of the maximum exercise capacity but there is no consensus on the lower or upper limit

Low Intensity

Low intensity inspiratory muscle training is the level of exercise intensity as measured by heart rate which ranges about 42-54% measured heart rate.

CHAPTER II

REVIEW OF LITERATURE

Section A: Studies on the performance evaluation in sedentary life style people.

Section B: Studies on the effectiveness of quality of life measures by Chronic Respiratory Disease Questionnarie Self-Administered Standard Format.

Section C: Stuides on the Dyspnoea measures by Modified Borg Scale.

Section D Studies on the effects of high intensity inspiratory muscle training in sedentary life style people.

Section E: Studies on the effects of low intensity inspiratory muscle training in sedentary life style people.

Section F: Study on the effect high intensity and low intensity inspiratory muscle insedentary life style people using threshold inspiratory muscle training device.

Section A

Studies on the performance evaluation in sedentary life style people

Sushant Meshram (2006) Cross sectional observation Study was conducted to subject with sedentary life Styles in lung function. Spirometric parameters were assessed in randomly 60 healthy males, non smoking non –obese subjects and sedentary worker .The group differed significant in FEV and PEFR. The Highest mean FEV and PEFR were observed in athletes had significantly better PEFR as compared to sedentary workers.

Curitiba(2014) Asystematic review studies to compare the strength of respiratory muscles between sedentary and Physically active elderly in training programs result physical activity programs offered by the selected studies led physically active elderly to have respiratory muscle strength statically higher than the sedentary .However this condition did not express itself as security to elderly to present level above the minimum predictive to normality.

Shobha Rani Vedald(2009) A comparative study of pulmonary function test among the yogic and sedentary group was conducted with 50 subject practicing yoga and 50 sedentary subject in age subject in age group 20-40 years. The test was recorded as per standard procedure using medspiror. The study groups were having higher mean percentage value FEVI / FVC ratio of 111.3 ±6.9 % as compared to sedentary group.

J. Pediatr (2014) A study was conducted with 92 adolescent divided in 4 groups according to obesity and gender. Anthropometric parameters and Spirometry for pulmonary function and respiratory muscle strength were measured before during and after exercise. Obese male had higher levels of maximum inspiration and expiration pressure compared to obese and eutrophic female .Expiratory reserve volume was lower in obese subject when compared to controls. Obese adolescents presented changes in PF at rest and changes remind during exercise. The present data showed inspite of different in lung growth, the mode of fat distribution alters pulmonary function differently obese female and male adolescents.

Section B

Studies on the effects of high intensity inspiratory muscle training in sedentary life style people

Stephanie, Davis H. Physical Therapy (2006) Conducted a study to examine whether high-intensity IMT resulted in change ventelatory function and ex's capacity in subject who were healthy 20 subject allighed in 2 group. The Training group completed an 8 week program of IMT and Control group did not participate in any form ah training. Base line and post training measure of were determined. The finding of the study suggested that HIIMT result in lung volume diaphragm thickness and exercise capacity in subject who are under sedentary lifestyle.

Hildegard et.al, (1995) An experimental study on the effect of inspiratory muscle training on dyspnoea, exercise performance and quality of life in COPD.20 patients were randomly divided into training group (Group 1) receiving 60-70% maximal sustained inspiratory pressure (SIP max) as a training load for 30 min daily, 6 days a week for 6 months and a control group (Group 2) received no training. Changes in dyspnoea and HRQL were measured. Results showed significant increases in SIP max, PI max in Group 1 than Group 2 and it was concluded that targeted IMT relieves dyspnoea and improves HRQL in COPD patient.

Belman et.al, (1988) Conducted an experimental study on the effect of targeted resistive ventilatory muscle training in COPD.17 patients were randomized into High Intensity training group using resistance plus target feedback device(TFD) and Low Intensity training group using resistor plus TFD. Result showed significant increase in PI max, Maximal sustained ventilatory capacity, Mean mouth pressure, Peak Inspiratory flow rate and Maximal sustained work rate more in High Intensity training group. This study concluded that targeted ventilatory muscle training with control of breathing strategy improves both ventilatory muscle strength and endurance.

Gavin Sturdy et.al., (2003) Conducted an experimental study to assess the feasibility of high-intensity, Interval-based respiratory muscle training in COPD.9 patients with moderate to severe COPD were assigned to receive three 20 min sessions per week, each session comprising seven 2min bouts of breathing against a constant inspiratory threshold load, each bout separated by 1min. Respiratory muscle strength and endurance were measured before and after training. Result showed significant improvement in PI max on completion of training and was concluded that high-intensity, interval-based respiratory muscle training is feasible resulting in improvements in respiratory muscle strength and endurance in moderate to severe COPD when performed 3times a week for 8weeks.

Eur Respir J (2006) Conducted study to investigate the effect of an interval based high intensity inspiratory muscle training program on inspiration muscle function dyspnoea and health related quality of life. Nine patients with moderate to severe COPD were assigned to receive three 20 min sessions per week, each session comprising seven 2min bouts of breathing against a constant inspiratory threshold load, each bout separated by 1min. Respiratory muscle strength and endurance were measured before and after training. Result showed significant improvement in PI max on completion of training and was concluded that high-intensity, interval-based respiratory muscle training is feasible resulting in improvements in respiratory muscle strength and endurance in moderate to severe COPD when performed 3times a week for 8weeks.

Section C

Studies on the effects of low intensity inspiratory muscle training in sedentary life style people

Barbara Pressure (2004) A study on high intensity respirator Vs low intensity respiratory muscle training on (Pi Max) incremental inspiratory threshold loading (PIH) inspiratory muscle endurance and 12 min distance test in sever COPD at 22%Pi max (Progressing From 5 min per session in week 1 to 18 min per session week 12) Group showed significant improvement in all four dependent variable while group 2 improved in (PIT) IE and 12 MD. The result suggested there is no significant difference between high and low resistive interval training.

Vogiatzis (2008) A conducted a study on interval training as an alternative modality to continues exercise in patient with COPD 36 patient with forced expiratory volume in one second of 45±4 % of the predicated value were randomly assigned to CT (base line peak work or IT alternative with 30 rest intervals) 40 min/day and 2 days / week for 12 weeks After training both group showed improvement in CRO–SR. The magnitude of improvement in their variable was not significant different among groups.

Davis (2004) a pilot feasibility randomized trial was conducted in patient with clinically stable obstructive respective using a pressure threshold device. Patients were instructed to carry out 5 IMT session weeks for a total 30 min / days .Control group received standard care outcome measure were completed at base line using six 10 point NRS modified Borg Scale, CRDQ Trail shows the IMT is effective in patient with moderate than LT patients.

Preusser et. al, (1994) Conducted an experimental study on the effect of High Intensity and Low Intensity Inspiratory muscle training in patients with COPD. 12 patients were assigned to receive supervised high resistive loading at 52% PI max and 8 patients were assigned to receive supervised low resistive loading at 22% PI max. Training was given 3 times weekly from 5min to 18min per session for 12 weeks and PI max, Incremental Inspiratory threshold loading (PITL), Inspiratory muscle endurance (IE) were taken as a parameter before and after 3 practice sessions. Result concluded that there was no significant difference between high and low resistive interval training in more severely impaired patients with COPD.

Serina JMC Entire (2016) Determined the effects of moderate intensity exercise training ET on inspiratory muscle fatigue. An additional inspiratory load during ET [ET+IL] would improve inspiratory muscle strength, IMF . 15 subjects were divided.6 weeks of training 3 days per week at 70% VO_2 peak for 30 minutes. The group breathed through inspiratory muscle trainer. Inspiratory muscle strength increased for both group to similar extent but ET+IL group was significantly faster than ET at weeks 6. The ET+IL group experienced less IMF.

Section D

Studies on the effectiveness of quality of life measures by Chronic Respiratory Disease Questionnarie Self-Administered Standard Format

JEA Williams (2007) Eighty patients with stable COPD has been referred for pulmonary rehabilitation compaleting CRO –SR at initial assessment. At the end of 7 week programme 35 patients completed both CRQ-SR and CRQ -1L administered 1week apart, before stating rehab and again at the end programme. There were large statically and significant changes in all dimenension of CRO –SR. The end result has self report of CRQ is sensitive to change in patient undergoing pulmonary rehabilitation.

M.Ghanem (2010) Randomized clinical trial on 39 COPD patient who recovered from acute exacerbation were allocated in 2month home based PR program in addition to pulmonary function test, six minute walk test. CRQ –SAS and quality of life scale short were used .It was compared between 25 patients with moderate to sever COPD who underwent 2 month PR program and 14 COPD

Who did not, the end the result showed improvement in both CRQ SAS and SF 36 were statistically significant.

Milo Apuhan (2009) three group of patient with COPD was assessed .the 44 patient of 1st group completed CRQ 2nd group under rehabilitation and cross section validity of CRQ and 3rd group without intervention to asses test retest reliability .The patient completed both CRQ –SR and Modified Borg Scale questions. The result showed that retest reliability was good for CRO-SR and dyspnoea.

Covey et.al., (2001) Conducted an experimental study on High intensity Inspiratory Muscle Training in COPD. 27 patients were assigned randomly to an Inspiratory Muscle Training (IMT) group or an educational control group to receive training with inspiratory pressure loads equal to 30% of maximal inspiratory pressure (PImax) and increased as tolerated to 60% of PImax for 30min a day for 16weeks using interval training techniques. Inspiratory muscle strength (PImax), respiratory muscle endurance (discontinuous incremental threshold loading test)[DIT4], dyspnoea (Chronic Respiratory Disease Questionnaire), and the Borg Scale ratings of perceived breathing difficulty (RPBD) were measured before and after training. The result showed that in the IMT group, PImax increased from 64-75cmH2O,performance on DC-ITL test increased from maximal load of 37-53cm H2O, RPBD decreased from 5.5 to 3.8 for equal loads on DC-ITL and the CRQ, Dyspnoea Scale improved from 18.1-22.4.

David Hilman et. al., (2001) Conducted an experimental study on the effects of an Interval-based high intensity inspiratory muscle training on Inspiratory muscle function, exercise capacity, dyspnoea and QOL.16 subjects were assigned to receive H-IMT at highest tolerable inspiratory threshold load and 17 subjects were assigned to receive S-IMT at 10% of PImax for 3times per week for 8weeks. Results showed significant increase in PImax by 29%, maximum threshold pressure by 56% and reduced dyspnoea and fatigue following H-IMT than S-IMT. It was concluded that H-IMT improves inspiratory muscle function in subjects with moderate-to-severe COPD and reductions in dyspnoea and fatigue.

Section E

Stuides on the Dyspnoea measures by Modified Borg Scale

Lisboa et. al,(1998) Conducted an experimental study on the effect of Inspiratory Muscle Training on exercise capacity in patients with chronic airflow limitation. 10 patients in Group 1 were assigned to receive training with 30% of PI max as a training load and 10 patients in Group 2 were assigned to receive training with 10% of PI max for 30 min daily for 6 days a week. Changes in PI max and dyspnoea were measured before and after training. Result showed significant increment in PI max in both groups and dyspnoea improved only in Group 1 and was concluded that inspiratory muscle training using a load of 30% PI max, reduces dyspnoea & increases walking capacity.

Marinella Beckerman et.al.,(1999) Conducted an experimental study on the effect of 1 year of specific inspiratory muscle training in patients with COPD. 42 patients were randomized into a group that received IMT for 1 year and control group that received training with a very low load. Result showed significant increase in inspiratory muscle strength , endurance, a decrease in the Borg score and improvement in HRQL in the training group but not in control group.

Harver et.al., (1989) Conducted an experimental study on the effect of targeted inspiratory muscle training on respiratory muscle function, clinical ratings of dyspnoea and perception of resistive loads in patients with COPD.19 patients with moderate to severe COPD assigning 10 patients to an Experimental Group (EG) and 9 to a Control Group(CG). Patients in the EG trained at 6 increasing levels of inspiratory resistance, whereas patients in the CG trained at a constant level of resistance for 15 minutes twice each day using a device that provided breath-to-breath visual feedback. Results showed significant increase in inspiratory muscle strength, decreased dyspnoea in the EG compared with CG and was concluded that targeted inspiratory muscle training

enhance respiratory muscle function and reduce dyspnoea in symptomatic patients moderate to severe COPD.

JC Villiot Danger (2010) Conducted study of increased inspiratory muscle work with dysponea and poor exercise tolerance in obese people. 20 obese patient hospitalized for 26 days with low calorie diet and physical activity. 10 patient performed RMET 30 minutes, 3-4 times/week , other 10 performed no respiratrory training .Both group matched for BMI 45 ±7 kilogram per meter square .Respiratory muscle strength ,dysponea, quality of life were assesed before and after. Respiratory muscle endurance increased in RMET group compared with control group RMEI group showed improvement on functional capacity and dysponea.

William Sheel.(2013) A systematic review of the studies assessing exercise training and IMT in individual for the improved respiratory function of patients with spinal cord injury. Thirteen Studies [5 exercise training, 8 IMT] where identified. Based on current literature, there is level 2 evidence supporting exercise training as an intervention to improve respiration strength and endurance. There is level 4 evidence to support IMT as an intervention that might decrease dysponea and improve function in people with spinal cord injury.

Section F

Study on the effect high intensity and low intensity inspiratory muscle insedentary life style people using threshole inspiratory muscle training device

Nield.M.A(1999) Conducted a pilot study to evaluate the ability of patients with COPD to accomplish 6weeks of IMT using a pressure threshold device, and to observe how the training affected inspiratory muscle strength and dyspnoea. 4 adults with severe COPD were assigned IMT sessions of 5 to 30 min duration and weekly training load increments of -2 to -4cmH2O over 6 week period with training device at loads of >30% of baseline PI max. Result showed improvement in inspiratory muscle strength and reduced dyspnoea on all subjects and was concluded that using a constant load, pressure threshold device to attain loads of >30% of patient's baseline PI max is a feasible way to accomplish IMT in adults with severe COPD.

Villafranca et.al (1999) Conducted an experimental study on the effect of inspiratory muscle training with an intermediate load on inspiratory power output in COPD. 31 patients were randomly divided into Group 1 trained with 30% PI max; Group 2 with 10% PI max ,Group 3 also trained with 30 % PI max and all groups used a threshold device for 10weeks.The power output during an incremental threshold test was evaluated before and after training. Result showed increment of maximal power output in all groups, increment being higher in groups trained with 30% PI max and it was concluded that in patients with COPD, the use of an intermediate threshold load for training improves power output.

Lisboa,et.al.,(1998) Conducted an experimental study on the effect of Inspiratory Muscle Training on exercise capacity in patients with chronic airflow limitation. 10 patients in Group 1 were assigned to receive training with 30% of PI max as a training load and 10 patients in Group 2 were assigned to receive training with 10% of PI max for 30 min daily for 6 days a week. Changes in PI max and dyspnoea were measured before and after training. Result showed significant increment in PI max in both groups and dyspnoea improved only in Group 1 and concluded that inspiratory muscle training using a load of 30% PI max, reduces dyspnoea & increases walking capacity.

Larson,et.al.,(1988) Conducted a comparative study on Inspiratory Muscle training (IMT) with a pressure threshold breathing device in patients with COPD. 22 patients were randomized into two groups comparing the effects of 2 months of IMT with pressure threshold breathing device at inspiratory pressure loads equal to either 15 or 30% of each patient's (PI max).12 patients were assigned in Group 1 to receive 15% load and 10 patients were assigned in Group 2 to receive 30% load. PI max , Endurance time and 12 min distance walk were measured before and after training. Result showed that 30% load improved PI max, Endurance time and 12min distance walk than with 15% load showed no improvements. It was concluded that the 30 % load was more effective than the 15% load in this sample.

Dulciane Nunes Paiva (2015) Conducted an experimental study to improve respiratory muscle strength by inspiratory muscular training [IMT] over the incentive spirometry. Healthy females were compared. Subject[40] control group [14] IS group [13]Threshold group[13].PI Max was measured before 15 days and 30 days of IMT, I S G increase PI Max at 15 days and 30 days of training. After 30 days of IMT the TG presented a PI Max which was higher than ISG. Thus concluded that IMT by threshold was more effective in increasing muscle strength.

International Journal of obesity 2007.

CHAPTER III

METHODOLOGY

3.1 Study Design:

The study was a pre test and post test experimental design in comparative nature.

3.2 Study Setting:

The study was conducted at Teknotruf IT Company, 51 Kalingaragam street, Ram Nagar, Gandhipuram, Coimbatore under the supervision of concerned authority.

3.3 Sample Size:

A total number of 30 subjects were selected and divided into High intensity inspiratory and low intensity inspiratory group with 15 patients in each.

3.4 Sampling Method:

Convenient sampling method

3.5 Selection Criteria:

3.5.1 Inclusion criteria

- The subject who were willing to participate.
- The subject who were clinically stable clinical and functional status
- Dyspnoea limited to (3-5) during ADL using Modified Borg Scale
- Age 35-50 years
- BMI 30–35 kg/m^2
- Both sex were used

3.5.2 Exclusion Criteria

- Dyspnoea at rest.
- The subject who have cardiac, orthopedic, respiratory and neurological problems.
- Any other systemic pathology.
- The subject associated with medical conditions which limits this exercise tolerance.
- Body mass index (BMI) > 30 kg/m^2
- Previous lung surgery.
- Use of long term O_2 therapy.
- Poor compliance
- Drug and Alcohol abuse
- Co_2 retention

3.6 Study Duration:

6 months (Intervention - 3 times per week for 8 weeks)

3.7 Materials:

1. Threshold Inspiratory Muscle Trainer
2. Dyspnoea - Modified Borg scale
3. Quality of Life - Chronic Respiratory Disease Questionnaire Self Administered Standardized Format

3.8 Parameter:

Dyspnoea:

Dyspnoea in daily activities was assessed using modified Borg Scale.

Quality of life:

It was assessed by using the Chronic Respiratory Disease Questionnaire Self Administered Standardized Format (CRQ-SAS)

3.9 Procedure:

Thirty healthy people with evidence of significant BMI-30-35kg/m^2 were recruited for the study with consideration of inclusion and exclusion criteria. After the informed consent was obtained, they were divided into high intensity inspiratory and low intensity inspiratory training group with 15 subjects in each group. Prior to muscle training dyspnoea during daily activities, QOL and respiratory exertion will be measured. High Intensity Inspiratory muscle training with 30% Of PImax initially ;increasing upto 50-80% of PImax as training load and Low intensity Inspiratory muscle training with 10% PImax initially and increasing upto 30%PImax as training load was given. The training session lasts for 15 minutes which comprise of 2 min of breathing on Threshold inspiratory Muscle Trainer followed by 1 min of rest. Training was given 3 times per week for 8 weeks. Pre and post test results were compared within the group and mean difference was compared between the groups.

3.10 Technique:

The following techniques were used for training the High Intensity Inspiratory Muscle and Low intensity Inspiratory Muscle group. After selection of 30 subjects with BMI 30-35 kg/m^2 according to inclusion criteria, the subjects were made aware of the respiratory muscle training programme.

High Intensity Inspiratory Muscle Training Protocol

The training was performed using a Threshold Inspiratory Muscle Trainer with 30% of PImax as training load initially and increasing upto 60% of PImax. While performing the breathing exercise, the subjects wore a nose clip to ensure breathing exclusively through the training device.

Frequency - 3 times per week for 8 weeks

Intensity - 30% to 60% of PImax

Time - 15 minutes

Type - High Intensity

Low Intensity Inspiratory Muscle Training Protocol

The training was performed using a Threshold Inspiratory Muscle Trainer with 10% of PI max as training load initially and increasing upto 30% of PI max. While performing the breathing exercise, the subjects wore a nose clip to ensure breathing exclusively through the training device.

Frequency - 3 times per week for 8 weeks

Intensity - 10% to 30% of PImax

Time - 15 minutes

Type - Low Intensity

FIG NO. 1 HIGH INTENSITY INSPIRATORY MUSCLE TRAINING

FIG.NO.2 : LOW INTENSITY INSPIRATORY MUSCLE TRAINING

CHAPTER IV

DATA ANALYSIS AND RESULT

This chapter deals with the analysis of datas collected from healthy people with BMI 30-35kg/m2 to compare the difference between High intensity inspiratory muscle and Low intensity inspiratory muscle training. Collected data were analyzed and tabulated in the following section.

Statistical Tool:

The collected data were subjected to statistical analysis using paired and unpaired "t" test to find out the research effectiveness.

Paired "t" Test

The paired t – test is used to find out the statistical significance between pre and post – test values of dyspnoea during daily activities, QOL before and after treatment for Group A and Group B separately.

Formula: Paired "t" test

$$s = \sqrt{\frac{\Sigma d^2 \frac{(\Sigma d)2}{n}}{n-1}}$$

$$t = \frac{d\sqrt{n}}{s}$$

d = Difference between the pre Test Vs post Test

$\bar{d}$ = Mean difference

n = total number of subjects

s = Standard deviation

Unpaired "t" test

The unpaired t – test is used to compare the statistically significant differences of dyspnoea during daily activities, QOL between group A & group B

Formula: Unpaired "t" test

$$s = \sqrt{\frac{(n_1-1)s_1^2+(n_2-1)s_2^2}{n_1+n_2-2}}$$

$$t = \frac{\overline{x_1}-\overline{x_2}}{s\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}}$$

n_1 = Total number of subject in Group – A

n_2 = Total number subject in Group – B

x_1 = Difference between Pre test Vs post test of Group A

$\overline{x_1}$ = Mean difference between pre Test Vs post test of Group A

x_2 = Difference between pre test Vs post Group – B

$\overline{x_2}$ = Mean difference between pre test Vs post test of Group – B

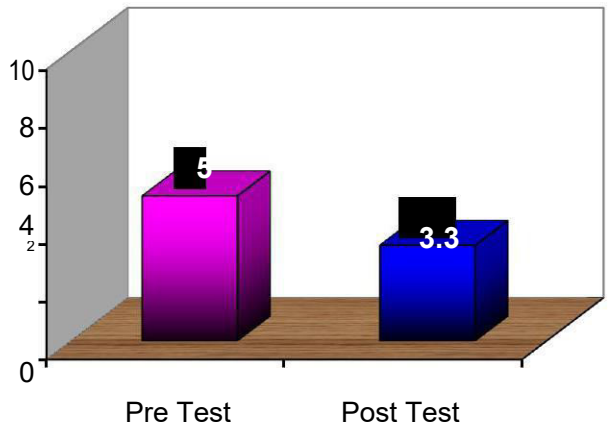
The statistical tools used in the study are Paired t-test and Unpaired t-test.

Table I - Perception of Dyspnoea for Group A

The comparative mean values, mean difference, standard deviation and Paired t-values between Pre Vs Post test of Perception of Dyspnoea in High Intensity Inspiratory Muscle trained Group-A.

S. No	Perception of Dyspnoea	Improvement			Paired t-value
		Mean	Mean Difference	S.D	
1.	Pre-test	5	1.7	0.75	10.32
2	Post- test	3.3			

Graph I – Perception of Dyspnoea for Group A



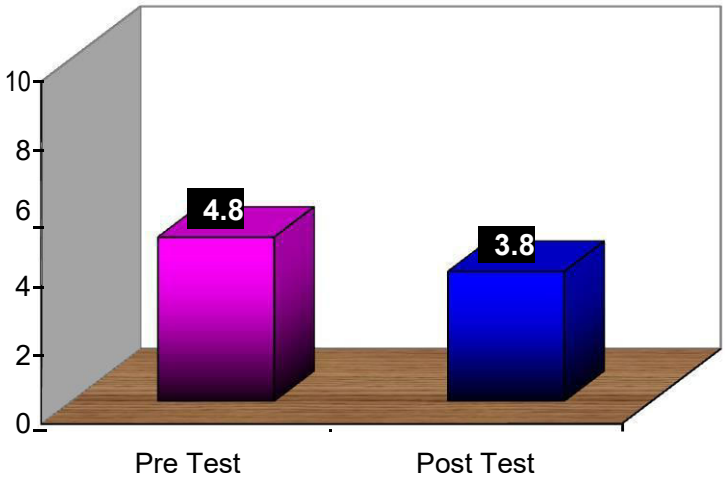
The Paired t-value of 10.32 was greater than the tabulated t-value 2.14 showed that there was statistically significant difference at 0.05 levels between Pre Vs Post test results. The Pre test mean was 5; Post test mean was 3.3 and mean difference was 1.7 which showed reduction on Perception of Dyspnoea in response to High Intensity Inspiratory Muscle Training for Group A samples.

Table II - Perception of Dyspnoea for Group B

The comparative mean values, mean difference, standard deviation and Paired t-values between Pre Vs Post tests of Perception of Dyspnoea in Low Intensity Inspiratory Muscle trained Group-B.

S. No	Perception of Dyspnoea	Improvement			Paired t-value
		Mean	Mean Difference	S.D	
1.	Pre-test	4.8	1	0.52	7.44
2	Post- test	3.8			

Graph II – Perception of Dyspnoea for Group B



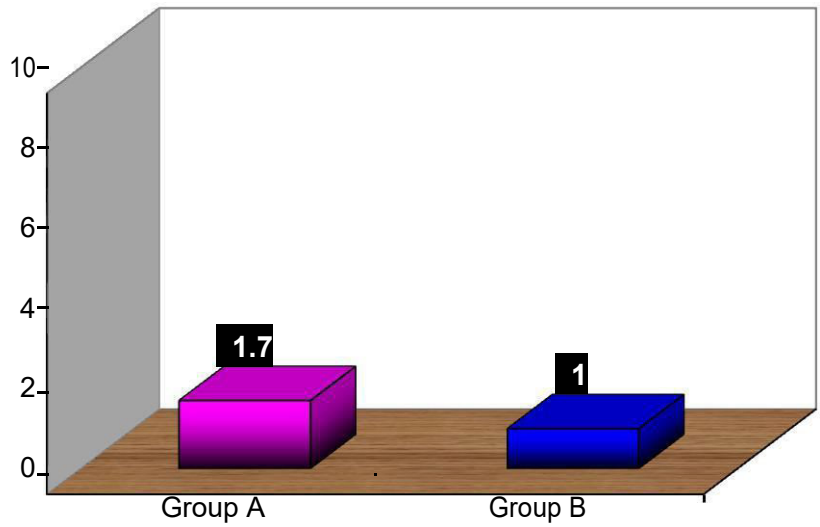
The Paired t-value of 7.44 was greater than the tabulated t-value 2.14 showed that there was statistically significant difference at 0.05 levels between Pre Vs Post test results. The Pre test mean was 4.8; Post test mean was 3.8 and mean difference was 1 which showed reduction on Perception of Dyspnoea in response to Low Intensity Inspiratory Muscle Training for Group B samples.

Table III - Perception of Dyspnoea for Group A & Group B

The comparative mean values, mean difference, standard deviation and Unpaired 't' –value between Group A and Group B on Perception Of Dyspnoea.

S. No	Perception of Dyspnoea	Improvement			Unpaired t-value
		Mean	Mean Difference	S.D	
1.	Group – A	1.7	0.7	0.64	4.34
2	Group – B	1			

Graph III – Perception of Dyspnoea for Group A & Group B



The Unpaired t-value of 4.34 greater than the tabulated t-value of 2.05 showed that there was statistically significant difference at 0.05 level between mean difference of Group-A and Group-B. The Pre Vs Post mean of Group-A was 1.7; the Pre Vs Post mean of Group –B was 1 and the mean difference of Group A and Group B was 0.7,which showed greater reduction in Perception of Dyspnoea in High Intensity Inspiratory Muscle trained Group A when compared to Low intensity Inspiratory Muscle trained Group B.

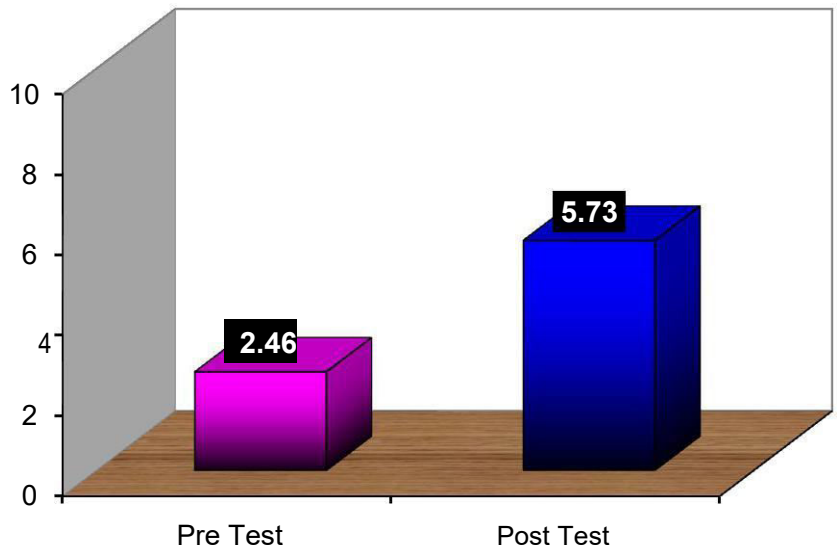
Therefore the study was rejecting the null hypothesis and was accepting alternate hypothesis.

Table IV – Quality of Life for Group A

The comparative mean values, mean difference, standard deviation and Paired t-values between Pre Vs Post test of Quality of Life(QOL) in High Intensity Inspiratory Muscle trained Group-A.

S. No	Quality of Life (QOL)	Improvement			Paired t-value
		Mean	Mean difference	S.D	
1.	Pre-test	2.46	3.27	0.92	12.61
2	Post- test	5.73			

Graph IV – Quality of Life for Group A



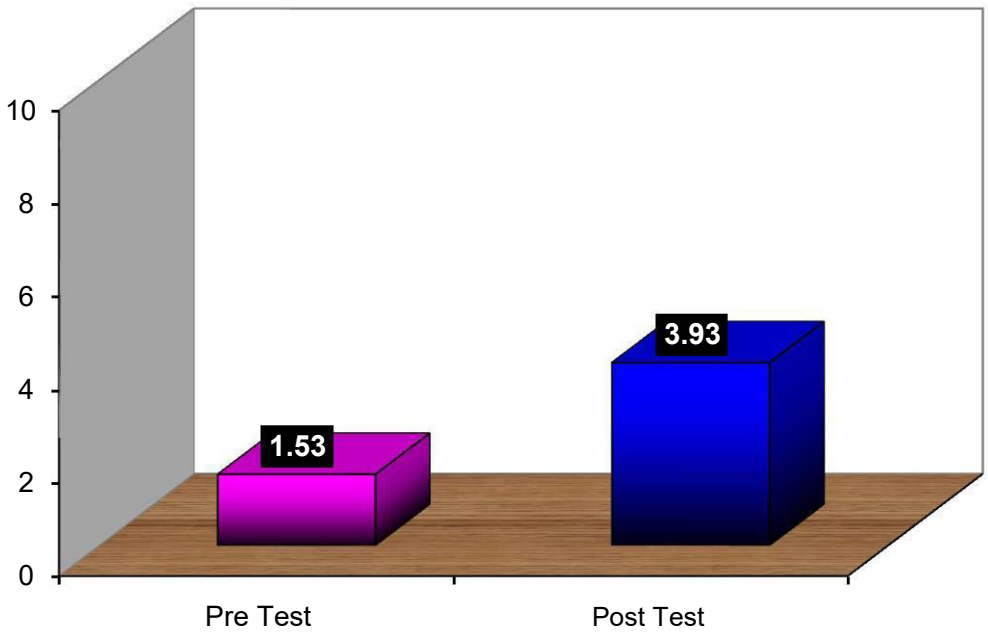
The Paired t-value of 12.61 was greater than the tabulated t-value 2.14 showed that there was statistically significant difference at 0.05 level between Pre Vs Post test results. The Pre test mean was 2.46; Post test mean was 5.73 and mean difference was 3.27 which showed improvement in Quality of Life (QOL) in response to High Intensity Inspiratory Muscle Training for Group A samples.

Table V – Quality of Life for Group B

The comparative mean values, mean difference, standard deviation and Paired t-values between Pre Vs Post tests of Quality of Life (QOL) in Low Intensity Inspiratory Muscle trained Group-B.

S. No	Quality of Life (QOL)	Improvement			Paired t-value
		Mean	Mean difference	S.D	
1.	Pre-test	1.53	2.4	0.64	12.09
2	Post- test	3.93			

Graph V – Quality of Life for Group B



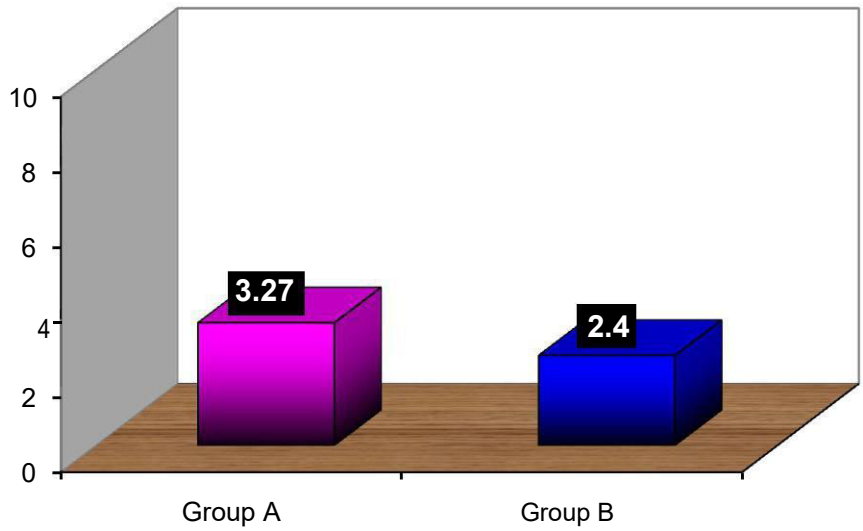
The Paired t-value of 12.09 was greater than the tabulated t-value 2.14 showed that there was statistically significant difference at 0.05 level between Pre Vs Post test results. The Pre test mean was 1.53; Post test mean was 3.93 and mean difference was 2.4 which showed improvement in Quality of Life in response to Low Intensity Inspiratory Muscle Training for Group B samples.

Table VI – Quality of Life for Group A & Group B

The comparative mean values, mean difference, standard deviation and Unpaired 't' –value between Group A and Group B on Quality of Life (QOL).

S. No	Quality of Life (QOL)	Improvement			Unpaired t-value
		Mean	Mean difference	S.D	
1.	Group – A	3.27	0.87	0.78	3.57
2	Group – B	2.4			

Graph VI – Quality of Life for Group A & Group B



The Unpaired t-value of 3.57 greater than the tabulated t-value of 2.05 showed that there was statistically significant difference at 0.05 levels between mean difference of Group-A and Group-B. The Pre Vs Post mean of Group-A was 3.27; the Pre Vs Post mean of Group –B was 2.4 and the mean difference of Group A and Group B was 0.87,which showed significant improvement in Quality of Life (QOL) in High Intensity Inspiratory Muscle trained Group A when compared to Low intensity Inspiratory Muscle trained Group B.

Therefore the study was rejecting the null hypothesis and was accepting alternate hypothesis.

CHAPTER V

DISCUSSION

The aim of the study was to compare the effect of High Intensity and Low Intensity Inspiratory Muscle Training on healthy people with BMI 30-35 kg/m^2 samples with Perception of Dyspnoea, Quality of Life (QOL) as parameters.

Discussion on High Intensity Inspiratory Muscle Training in Group A

In the analysis and interpretation of Perception of Dyspnoea in Group A

The Paired t-value of 10.32 was greater than the tabulated t-value 2.14 showed that there was statistically significant difference at 0.05 levels between Pre Vs Post test results. The Pre test mean was 5; Post test mean was 3.3 and mean difference was 1.7 which showed reduction on Perception of Dyspnoea in response to High Intensity Inspiratory Muscle Training for Group A samples.

In the analysis and interpretation of Quality of Life in Group A

The Paired t-value of 12.61 was greater than the tabulated t-value 2.14 showed that there was statistically significant difference at 0.05 levels between Pre Vs Post test results. The Pre test mean was 2.46; Post test mean was 5.73 and mean difference was 3.27 which showed improvement in Quality of Life (QOL) in response to High Intensity Inspiratory Muscle Training for Group A samples.

The study results of William sheels, Nield, Covey, and David Hilman were similar to the Present study results in which High Intensity Inspiratory Muscle Training improved Quality of Life and reduced Perception of Dyspnoea.

Discussion on Low Intensity Inspiratory Muscle Training in Group B

In the analysis and interpretation of Perception of Dyspnoea in Group B

The Paired t-value of 7.44 was greater than the tabulated t-value 2.14 showed that there was statistically significant difference at 0.05 levels between Pre Vs Post test results. The Pre test mean was 4.8; Post test mean was 3.8 and mean difference was 1 which showed reduction on Perception of Dyspnoea in response to Low Intensity Inspiratory Muscle Training for Group B samples.

In the analysis and interpretation of Quality of Life in Group B

The Paired t-value of 12.09 was greater than the tabulated t-value 2.14 showed that there was statistically significant difference at 0.05 levels between Pre Vs Post test results. The Pre test mean was 1.53; Post test mean was 3.93 and mean difference was 2.4 which showed improvement in Quality of Life in response to Low Intensity Inspiratory Muscle Training for Group B samples.

The study results of William sheel, J.Pediatrssupport the present study result in which Low Intensity Inspiratory Training improved Quality of Life and reduced Perception of Dyspnoea.

Discussion on High Intensity and Low Intensity Inspiratory Muscle Training between Group A and Group B

In the analysis and interpretation of Perception of Dyspnoea in Group A and Group B

The Unpaired t-value of 4.34 greater than the tabulated t-value of 2.05 showed that there was statistically significant difference at 0.05 levels between mean difference of Group-A and Group-B. The Pre Vs Post mean of Group-A was 1.7; the Pre Vs Post mean of Group –B was 1 and the mean difference of Group A and Group B was 0.7,which showed greater reduction in Perception of Dyspnoea in High Intensity Inspiratory Muscle trained Group A when compared to Low intensity Inspiratory Muscle trained Group B.

In the analysis and interpretation of Quality of Life in Group A and Group B

The Unpaired t-value of 3.57 greater than the tabulated t-value of 2.05 showed that there was statistically significant difference at 0.05 level between mean difference of Group-A and Group-B.The Pre Vs Post mean of Group-A was 3.27; the Pre Vs Post mean of Group –B was 2.4 and the mean difference of Group A and Group B was 0.87,which showed significant improvement in Quality of Life (QOL) in High Intensity Inspiratory Muscle trained Group A when compared to Low intensity Inspiratory Muscle trained Group B.

The study result of Willia Sheel and Serina Jmc Entire supported the present study result in which High Intensity Inspiratory Muscle training in Group A showed more significant reduction in Perception of Dyspnoea than Low Intensity Inspiratory Muscle Training in Group B.

The study result of William Sheel and Hildegard supported the present study result in which High Intensity Inspiratory Muscle training in Group A showed more

significant improvement in QOL than Low Intensity Inspiratory Muscle Training in Group B.

Healthy people with evidence of significant BMI 30-35 Kg/m^2 were recruited with consideration of inclusion and exclusion criteria. After the informed consent was obtained, they were divided into high and low intensity inspiratory traning groups. Prior to muscle traning, dyspnoea during daily activities, QOL and respiratory exertion will be measured.

A person uses 10-15% of total lung capacity during normal breathing. With IMT a person can increase amount of lung capacity. Deeper breathing uses bit more energy and allows more O_2 to enter blood stream with each breath while strengthening the breathing muscles. This strengthening significantly reduces the amount O_2 to breathing muscles requires during exercise and resulting more O_2 being available for other muscles.

During IMT the body demands for O_2 increases and breathing volume also rised to cope with O_2 increase. For this work numerous muscles surrounding the lungs contract in a co-ordinated manner. As intensity of exercise increase, the respiratory muscles contract more forcefully and more rapidly to keep pase with body's substantial as it increase in metabolism.

Increase in effort represents the increase in motor command. For a given pressure per breath, the perception of effort is a function of maximal inspiratory pressure so that greater the Pbr / MIP ratio the greater the perception of respiratory effort. With exercise respiratory impedance increase, resulting in a greater velocity of shortening and less pressure, both peak of pressure and velocity of inspiratory muscle shortening contribute independently.

During exercise, a greater tidal volume increases, end- inspiratory lung volume forcing the subject to breath at high volume in the flat part of the pressure-volume curve and increase the inspiratory pressure per breath. The maximal pressure

generating capacity diminishes at high lung volume and decrease with the increasing velocity of muscle shortening for the given lung volume.

Respiratory muscle recruitment signals the ribcage to assist the diaphragm. The power of diaphragm progressively increases with exercise. The velocity of shortening of ribcage inspiratory muscle is also correlated with the perception of effort.

Afferent signal from mechanoceptors in the joint, tendon and muscles of the chest wall to the brain appear to play a role in modulating respiratory sensation. Afferents from intercostals muscles to the cerebral cortex and contribute propioception and kinesthesia. During hypercapnia associated with the resistive load the effort of vibration on the chestwall produces a reduction in dyspnea at a constant level of central drive.

The strength and endurance of the diaphragm and intercoastal muscles improves. This results in an improved ability to breath in more air, for longer with less fatigue and improves the endurance of respiratory muscles.

Therefore the present study was accepting the alternate hypothesis and was rejecting the null hypothesis.

Reason for reduction in Perception of Dyspnoea following High Intensity and Low Intensity Inspiratory Muscle training:

Weiner (2004) specific IMT at different loads increases Forced Vital Capacity (FVC) of the patient, their overall lung volume increases. This produces a direct decrease in their airway resistance and decrease in their levels of dyspnoea.

Kim (1984) IMT at different loads increases the metabolic capability of muscle ,such that cellular concentrations of energy producing substrates drop to minimal levels thereby improving ventilatory function and reducing work of breathing.

Reason for improvement in QOL following High Intensity and Low Intensity Inspiratory Muscle Training:

Dulciane Nunes Daiva (2015) use of threshold devices repeatedly, increases the Inspiratory muscle strength. With strengthening of these muscles, the patients level of dyspnoea decreases as the work of breathing becomes easier and patients are able to perform physical activities more easily and improve their Health related Quality of Life (HRQL).

William Sheel (2001) increasing inspiratory muscle function induces morphological changes in the diaphragm and increases lung volumes. This further decreases work of breathing and increase the physical work capacity improving QOL.

Reason for improvement of QOL and reduction of Dyspnoea, more in High Intensity Inspiratory Muscle Training than Low Intensity Inspiratory Muscle Training:

Leith and Bradley (1976) - increase in vital capacity and Total lung capacity more in HIMT causing increased ability of inspiratory muscles to expand the thorax. This induces morphological changes (increase in thickness of diaphragm, increase in number and size of myofibrils) thereby increasing inspiratory muscle efficiency and reducing respiratory exertion more in HIMT than LIMT.

J.Peditr(2014)) improvement in inspiratory muscle strength and endurance more in HIMT due to structural changes in inspiratory muscle fibres. This help relieve dyspnoea and improve QOL more in HIMT than LIMT.

CHAPTER VI

CONCLUSION

The Purpose of this study was to compare the effectiveness of High Intensity and Low Intensity Inspiratory Muscle Training in healthy people with BMI 30-35 kg/m^2.

A total number of 30 subjects of age group between 35-50 years diagnosed with BMI 30-35 kg/m^2 were randomly selected for the study. They were divided into two groups; High Intensity Inspiratory Muscle Training (Group A) and Low Intensity Inspiratory Muscle Training (Group B).

After randomizing, Group A subjects were given High Intensity Inspiratory Muscle Training for a Period of 24 weeks. Group B subjects were given Low Intensity Inspiratory Muscle Training for a period of 24 weeks. Before and after 24 weeks of training program, the pre and post test values of Perception of Dyspnoea and Quality of Life were measured.

The Paired t-test was used to compare the Pre test Vs Post test values of Perception of Dyspnoea and Quality of Life.

Based on the statistical analysis, the result of this study showed that there was significant improvement in both groups following High Intensity and Low Intensity Inspiratory Muscle Training Programme.

Based on the analysis and interpretation of Perception of Dyspnoea, the unpaired t-value 4.34 was greater than the tabulated t-value 2.05 at 0.05 level which showed a statistically significant difference between Pre Vs. Post test results of Group A& B. The mean value of Group-A was 1.7; Group B was 1 and the mean difference was 0.7, which showed a significant reduction in Perception of Dyspnoea in High Intensity Inspiratory Muscle trained Group A compared to Low intensity Inspiratory Muscle trained Group B.

Based on the analysis and interpretation of Quality of Life (QOL), the unpaired t-value 3.57 was greater than the tabulated t-value 2.05 at 0.05 level which showed a statistically significant difference between Pre Vs. Post test results of Group A & B. The mean value of Group-A was 3.27; Group B was 2.4 and the mean difference was 0.87, which showed a significant improvement in Quality of Life (QOL) in High Intensity Inspiratory Muscle trained Group A compared to Low intensity Inspiratory Muscle trained Group B.

The study showed a significant reduction in and Perception of Dyspnoea and an Increase in Quality of Life (QOL) in sedentary life people with BMI 30-35 kg/m^2 after the High Intensity and Low Intensity Inspiratory Muscle Training.

The study showed that the High Intensity Inspiratory Muscle Training was most effective than Low Intensity Inspiratory Muscle Training on Perception of Dyspnoea and Quality of Life (QOL).

LIMITATIONS:

- This was very short term and therefore to make it more valid long term is necessary.
- Since the study has been done with smaller number of subjects further studies should be conducted on the large group of sedentary life style people.
- Certain factors such as nutritional factors, psychological status could not control during the period of study.
- A control group with only conventional therapy was not used in this study.
- CRQ/SAS was only used for measuring the Quality of life.
- Modified Borg Scale used for dyspnoea.
- Only ‘t’ test was used for statistical analysis.

SUGGESTIONS:

- A similar study can be conducted with respiratory muscle training to improve exercise performance in healthy subjects.
- A similar study can be conducted with Inspiratory muscle training at different loads for peoples with BMI above 35 kg/m^2
- A similar study can be conducted with Inspiratory muscle training for chronic heart failure patients.
- A similar study can be conducted with Inspiratory muscle training at different loads for patients with neuromuscular diseases.
- A similar study can be conducted with Inspiratory muscle training for patients with spinal cord injury.

CHAPTER VIII

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CHAPTER VIII

ANNEXURE

ANNEXURE I - INFORMED CONSENT FORM

TITLE: A COMPARATIVE STUDY ON EFFECTIVENESS OF HIGH INTENSITY AND LOW INTENSITY INSPIRATORY MUSCLE TRAINING IN SEDENTARY LIFE STYLE PEOPLE

INVESTIGATOR:

CO-INVESTIGATORS:

PURPOSE OF THE STUDY:

I ---------- ---------- have been informed that this study will help clinicians & therapists to find out the ----------
---

PROCEDURE:

I understand that I'll undergo ----------

----------under the direct supervision of the physiotherapist. I am aware that I have to follow therapist's instruction as has been told to me.

RISK AND DISCOMFORT:

I understand that there are no potential risks associated with this procedure, and understand that----------
---------- will accompany me during this procedure. There are no known hazards associated with this procedure.

CONFIDENTIALITY:

I understand that the medical information produced by this study will be confidential. If the data are used for publication in the medical literature or for teaching purpose, no names will be used. And photographs, audio and videotapes will be used without identity for publication and presentation.

PHOTOGRAPHY CONSENT:

--------- Have explained to me that photography are required in order to illustrate various aspects of the study for the thesis and other articles, and at the presentation or conference. By giving my consent I authorize---------- to use any of the photographs taken of me in printed format, in slides for presentation.

REQUEST FOR MORE INFORMATION:

I understand that I may ask any question about the study at any times. ----------are available to answer my question. Copy of this concern form will be given to me keep for my careful reading.

REFUSAL OR WITHDRAWAL OF PARTICIPATION:

I understand that my participation is voluntary and I may withdraw consent and discontinue participation at any time after he has explained the reasons for doing so.

INJURY STATEMENT:

I understand that the diagnostic/ treatment procedure, under the guidance of my therapist, is likely to cause any / no injury. In such case medical attention will be provide, but no compensation will be provided. I understand my agreement to participation in this study and I am not waiving any of my legal rights. I confirm that-

---

---------- have explained me the purpose of the study, the study procedure and possible rick that I may experience.

I have read and I have understood this concern to participate as a subject in this study.

---------- ----------

SUBJECT **DATE**

---------- ----------

WITNESS SIGNATURE **DATE**

I have explained----------the purpose of the research, the procedure required and the possible risks and benefits, to the best of my ability.

---------- ----------

INVESTIGATOR **DATE**

ANNEXURE II - ASSESSMENT CHART

Name : Date:

Age :

Sex :

Occupation :

Address :

Chief Complaints :

Subjective Examination :

Objective Examination :

i) Observation :

ii) Palpation :

iii) Examination :

Diagnosis :

Mode of Treatment

Treatment	***Given***
High Intensity Training	
Low Intensity Training	

Prognosis Chart

	Pre Test	***Post Test***
Modified Borg Scale		
Chronic Respiratory Questionnaire		

ANNEXURE III - PARAMETER

CHRONIC RESPIRATORY QUESTIONNAIRE

This questionnaire is designed to find out how you have been feeling during the last 2 weeks. In the first section, you will be asked to answer questions about activities which make some people feel short of breath. In the next section, you will answer questions about your mood and how you have been feeling.

Please read these instructions for completing this questionnaire:

Please read each question carefully and then place an "x" in the box beside the answer that best describes you. If you are unsure about how to answer a question, please give the best answer you can.

If you would like to change an answer, put a line through the box you want to change. Place an "x" in the box beside the option you would like to choose instead. Remember, there are no right or wrong answers.

Your answers to this questionnaire will be kept confidential.

Below is a list of activities which make some people with lung problems feel short of breath.

For each of the items below, place an "x" in the box that best describes how much shortness of breath you have had while doing that activity during the **LAST 2 WEEKS.**

The last column has been provided for you to indicate if you have **NOT DONE** an activity during the last two weeks.

(Place an "x" in one box on each line)

	ACTIVITIES:	Extremely short of breath	Very short of breath	Quite a bit short of breath	Moderate shortness of breath	Some shortness of breath	A little shortness of breath	Not at all short of breath	Not Done
1	Feeling emotional such as angry or upset	1	2	3	4	5	6	7	8
2	Taking care of your basic needs (bathing, showering, eating or dressing)	1	2	3	4	5	6	7	8
3	Walking	1	2	3	4	5	6	7	8
4	Performing chores (such as housework, shopping, groceries)	1	2	3	4	5	6	7	8
5	Participating in social activities	1	2	3	4	5	6	7	8

These next questions ask you about your energy in general and how your mood has been during the **LAST 2 WEEKS**. Please put an "x" in a box, from 1 to 7 that best describes how you have felt.

6. In general, how much of the time during the **LAST 2 WEEKS** have you felt frustrated or impatient?

1	All of the time	☐
2	Most of the time	☐
3	A good bit of the time	☐
4	Some of the time	☐ (Place an „X" in one box only)
5	A little of the time	☐
6	Hardly any of the time	☐
7	None of the time	☐

7. How often during the **LAST 2 WEEKS** did you have a feeling of fear or panic when you had difficulty getting your breath?

1	All of the time	☐
2	Most of the time	☐
3	A good bit of the time	☐
4	Some of the time	☐ (Place an „X" in one box only)
5	A little of the time	☐
6	Hardly any of the time	☐
7	None of the time	☐

8. What about fatigue? How tired have you felt over the **LAST 2 WEEKS?**

1	All of the time	☐
2	Most of the time	☐
3	A good bit of the time	☐
4	Some of the time	☐ (Place an „X" in one box only)
5	A little of the time	☐
6	Hardly any of the time	☐
7	None of the time	☐

9. How often during the **LAST 2 WEEKS** have you felt embarrassed by your coughing or heavy breathing?

1	All of the time	☐	
2	Most of the time	☐	
3	A good bit of the time	☐	
4	Some of the time	☐	(Place an „X" in one box only)
5	A little of the time	☐	
6	Hardly any of the time	☐	
7	None of the time	☐	

10. In the **LAST 2 WEEKS**, how much of the time did you feel very confident and sure that you could deal with your illness?

1	All of the time	☐	
2	Most of the time	☐	
3	A good bit of the time	☐	
4	Some of the time	☐	(Place an „X" in one box only)
5	A little of the time	☐	
6	Hardly any of the time	☐	
7	None of the time	☐	

11. How much energy have you had in the **LAST 2 WEEKS**?

1	All of the time	☐	
2	Most of the time	☐	
3	A good bit of the time	☐	
4	Some of the time	☐	(Place an „X" in one box only)
5	A little of the time	☐	
6	Hardly any of the time	☐	
7	None of the time	☐	

12. In general, how much of the time did you feel upset, worried, or depressed during the **LAST 2 WEEKS**?

1	All of the time	☐	
2	Most of the time	☐	
3	A good bit of the time	☐	
4	Some of the time	☐	(Place an „X“ in one box only)
5	A little of the time	☐	
6	Hardly any of the time	☐	
7	None of the time	☐	

13. How often during the **LAST 2 WEEKS** did you feel you had complete control of your breathing problems?

1	All of the time	☐	
2	Most of the time	☐	
3	A good bit of the time	☐	
4	Some of the time	☐	(Place an „X“ in one box only)
5	A little of the time	☐	
6	Hardly any of the time	☐	
7	None of the time	☐	

14. How much of the time during the **LAST 2 WEEKS** did you feel relaxed and free of tension?

1	All of the time	☐	
2	Most of the time	☐	
3	A good bit of the time	☐	
4	Some of the time	☐	(Place an „X“ in one box only)
5	A little of the time	☐	
6	Hardly any of the time	☐	
7	None of the time	☐	

15. How often during the **LAST 2 WEEKS** have you felt low in energy?

1	All of the time	☐	
2	Most of the time	☐	
3	A good bit of the time	☐	
4	Some of the time	☐	(Place an „X" in one box only)
5	A little of the time	☐	
6	Hardly any of the time	☐	
7	None of the time	☐	

16. In general, how often during the **LAST 2 WEEKS** have you felt discouraged or down in the dumps?

1	All of the time	☐	
2	Most of the time	☐	
3	A good bit of the time	☐	
4	Some of the time	☐	(Place an „X" in one box only)
5	A little of the time	☐	
6	Hardly any of the time	☐	
7	None of the time	☐	

17. How often during the **LAST 2 WEEKS** have you felt worn out or sluggish?

1	All of the time	☐	
2	Most of the time	☐	
3	A good bit of the time	☐	
4	Some of the time	☐	(Place an „X" in one box only)
5	A little of the time	☐	
6	Hardly any of the time	☐	
7	None of the time	☐	

18. How happy, satisfied, or pleased have you been with your personal life during the **LAST 2 WEEKS**?

1	All of the time	☐	
2	Most of the time	☐	
3	A good bit of the time	☐	
4	Some of the time	☐	(Place an „X" in one box only)
5	A little of the time	☐	
6	Hardly any of the time	☐	
7	None of the time	☐	

19. How often during the **LAST 2 WEEKS** did you feel upset or scared when you had difficulty getting your breath?

1	All of the time	☐	
2	Most of the time	☐	
3	A good bit of the time	☐	
4	Some of the time	☐	(Place an „X" in one box only)
5	A little of the time	☐	
6	Hardly any of the time	☐	
7	None of the time	☐	

20. In general, how often during the **LAST 2 WEEKS** have you felt restless, tense, or uptight?

1	All of the time	☐	
2	Most of the time	☐	
3	A good bit of the time	☐	
4	Some of the time	☐	(Place an „X" in one box only)
5	A little of the time	☐	
6	Hardly any of the time	☐	
7	None of the time	☐	

Domain scores:

The scores for each question of each dimension are added together AND DIVIDED BY THE NUMBER OF completed QUESTIONS IN EACH DOMAIN.

Review of the completed questionnaire should occur to ensure that questions are not missed during the completion of the questionnaire.

Dyspnea domain: The mean of questions 1, 2, 3, 4, 5 (question 1 + question 2 + question 3 + question 4 + question 5) divided by the number of questions answered excluding those not done (typically 5, but sometimes respondents do not respond to all questions)

Fatigue: The mean of questions 8, 11 15, 17 calculated as the score (question 8 + question 11 + question 15 + question 17) divided by 4, which is the number of questions answered (questions not answered or missed should be excluded).

Emotional Function: The mean of questions 6, 9, 12, 14, 16, 18, 20 calculated as the score (question 6 + question 9 + question 12 + question 14 + question 16, + question 18 + question 20) divided by 7, which is the number of questions answered (questions not answered or missed should be excluded).

Mastery: The mean of questions 7, 10, 13, 19 calculated as the score (question 7 + question 10 + question 13 + question 19) divided by 4, which is the number of questions answered (questions not answered or missed should be excluded).

MODIFIED BORGS SCALE (For Dyspnoea)

Dyspnoea in daily activities was assessed using modified Borg Scale.

Rate of perceived exertion (Borg Scale)

0 - Nothing at all

0.5 -Very very weak

1 - Very weak

2 - Weak

3 - Moderate

4 - Somewhat strong

5 - Strong

6 -

7 -Very strong

8 -

9 -

10 -Very very strong

ANNEXURE IV – MASTER CHART

GROUP A

(HIGH INTENSITY INSPIRATORY MUSCLE TRAINING)

S.No.	Perception of Dyspnoea		Quality of Life (QOL)	
	Pre	Post	Pre	Post
1.	5	3	3	5
2.	5	4	3	5
3.	5	3	3	6
4.	6	3	3	5
5.	4	2	3	6
6.	5	4	2	5
7.	5	4	4	6
8.	4	2	2	6
9.	6	4	2	6
10.	6	5	2	6
11.	5	2	2	6
12.	5	3	2	6
13.	5	4	2	6
14.	4	2	2	6
15.	6	5	2	6

GROUP B

(LOW INTENSITY INSPIRATORY MUSCLE TRAINING)

S.No.	Perception of Dyspnoea		Quality of Life (QOL)	
	Pre	Post	Pre	Post
1.	4	3	3	5
2.	5	5	2	4
3.	5	4	2	4
4.	4	3	2	5
5.	4	3	2	4
6.	4	4	3	6
7.	6	5	1	3
8.	4	3	1	4
9.	6	5	1	3
10.	6	5	1	4
11.	5	3	1	3
12.	5	4	1	3
13.	4	3	1	4
14.	6	4	1	4
15.	4	3	1	3

ANNEXURE V

BODY MAST INDEX CHART

Category	BMI range – kg/m^2
Very severely underweight	Less than 15
Severely underweight	From 15.0 to 16.0
Underweight	From 16.0 to 18.5
Normal (healthy weight)	From 18.5 to 25
Overweight	From 25 to 30
Obese Class I (Moderately obese)	From 30 to 35
Obese Class II (Severely obese)	From 35 to 40
Obese Class III (Very severely obese)	Over 40